Retrieval of aerosol properties above clouds from satellites: an overview

Fabien Waquet[a,*], Céline Cornet[a], Fanny Peers[b], Lucia T. Deaconu[c], Nicolas Ferlay[a], and Aurélien Chauvigné[a]

[a]*LOA, UMR CNRS 8518, Université de Lille, Lille, France*
[b]*CEMPS, University of Exeter, Exeter, EX4 4QE, UK*
[c]*Department of Physics, University of Oxford, OX1 3PU, Oxford, UK*

[*]*Presenting author (fabien.waquet@univ-lille.fr)*

Remote sensing of aerosols in cloudy scenes is of primarily importance for the study of aerosols and clouds and as well as their interactions. New spaceborne remote sensing methods were developed these last 10 years for aerosols above clouds. These technics mainly allow to retrieve the optical thickness of the lofted aerosol layer. For some of these methods, the properties of size and absorption of these particles as well as some properties of the below cloud layer particles can be estimated.

After an overview of the different existing active and passive methods, we will recall the sensitivity of passive spectral and polarized measurements to aerosol above cloud scenes. We will further present the main results obtained with the method developed for the POLDER instrument [1], in terms of aerosol properties and impacts retrieved at global scale. Then, we will discuss the results of the inter-comparison performed between the POLDER and CALIOP sensors in function of the relative position of the aerosol and cloud layers [2].

In a second part, we will discuss some perspectives and limitations. The next polarimeter 3MI of ESA (2022) will provide polarized measurements up to 2.2 μm and will be supplemented with other sensors providing measurements in the UV (UV-NS) and in the thermal-infrared (IASI-NG). The potential of the spectral extension of the POLDER method to 3MI will be notably discussed as well as the possibility of detecting aerosols over fractional cloud covers [3].

References

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